Hanford Advisory Board

Single Shell Tank Leak Response – Potential Advice
September 2021

Jeff Burright, Oregon Dept. of Energy, TWC member

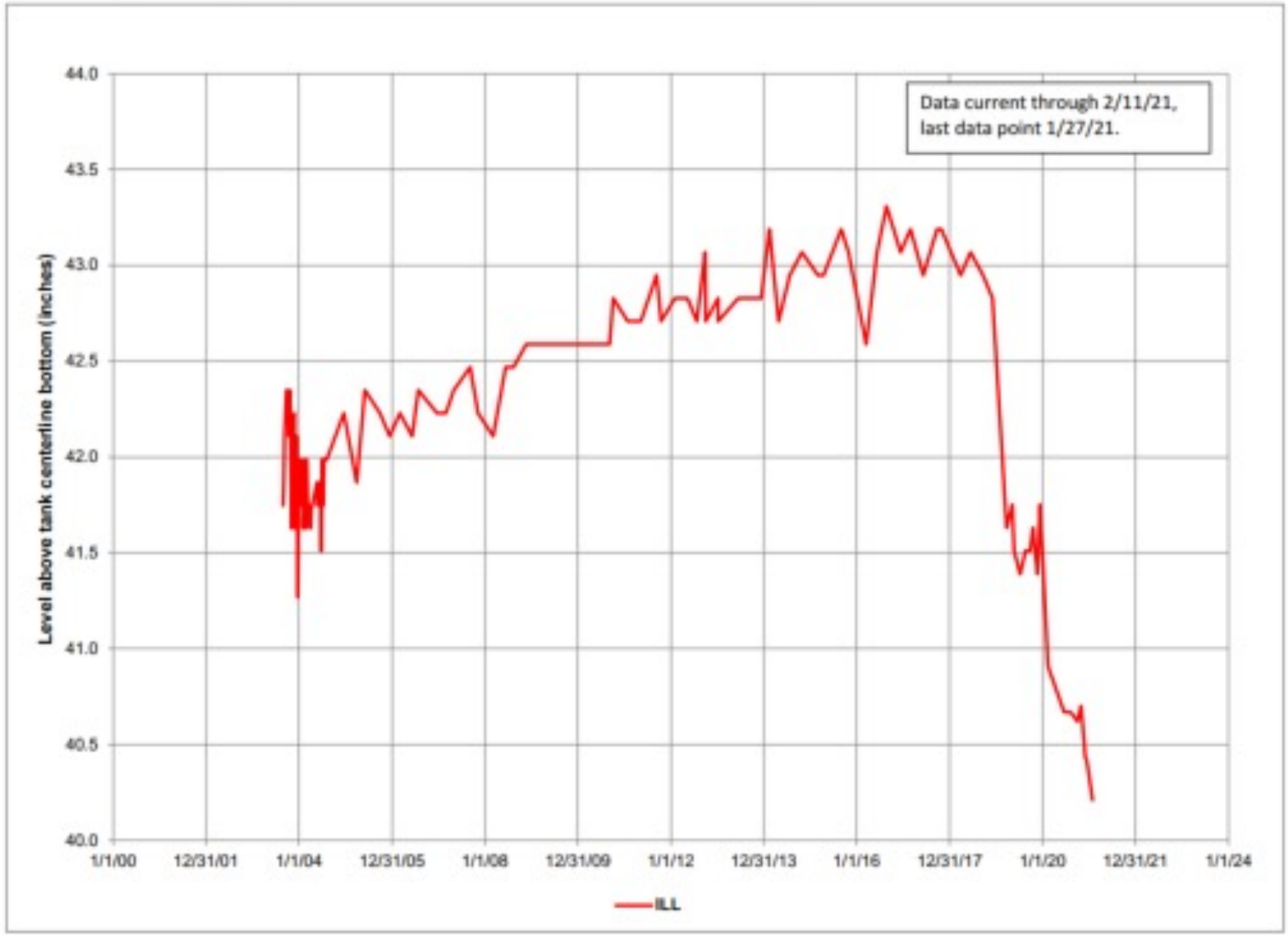


Figure 5-2. Tank B-109 ILL Data Since 2003 LOW Installation

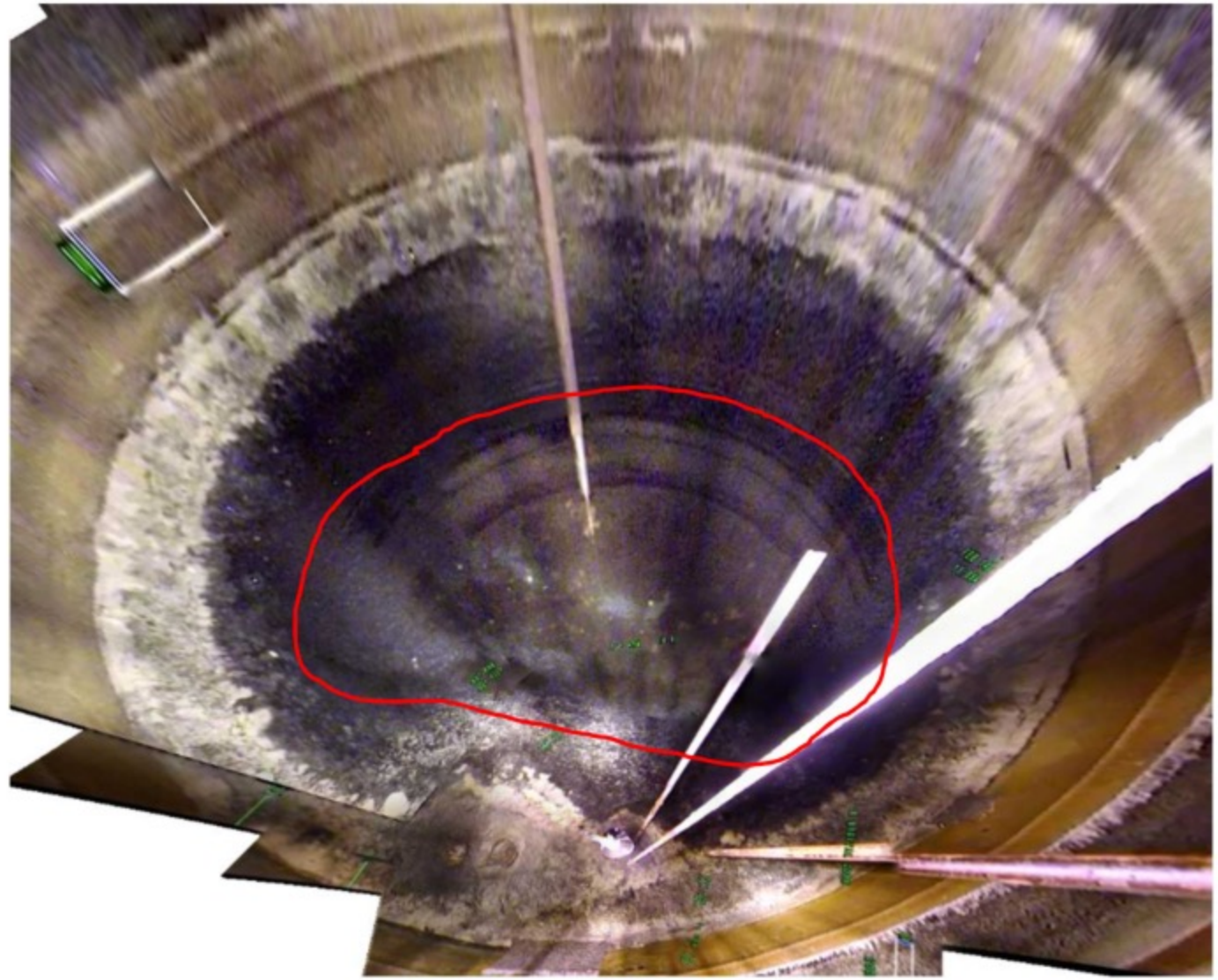


Figure 5-5. Tank B-109 February 11, 2014 Waste Surface Composite View from Riser 2

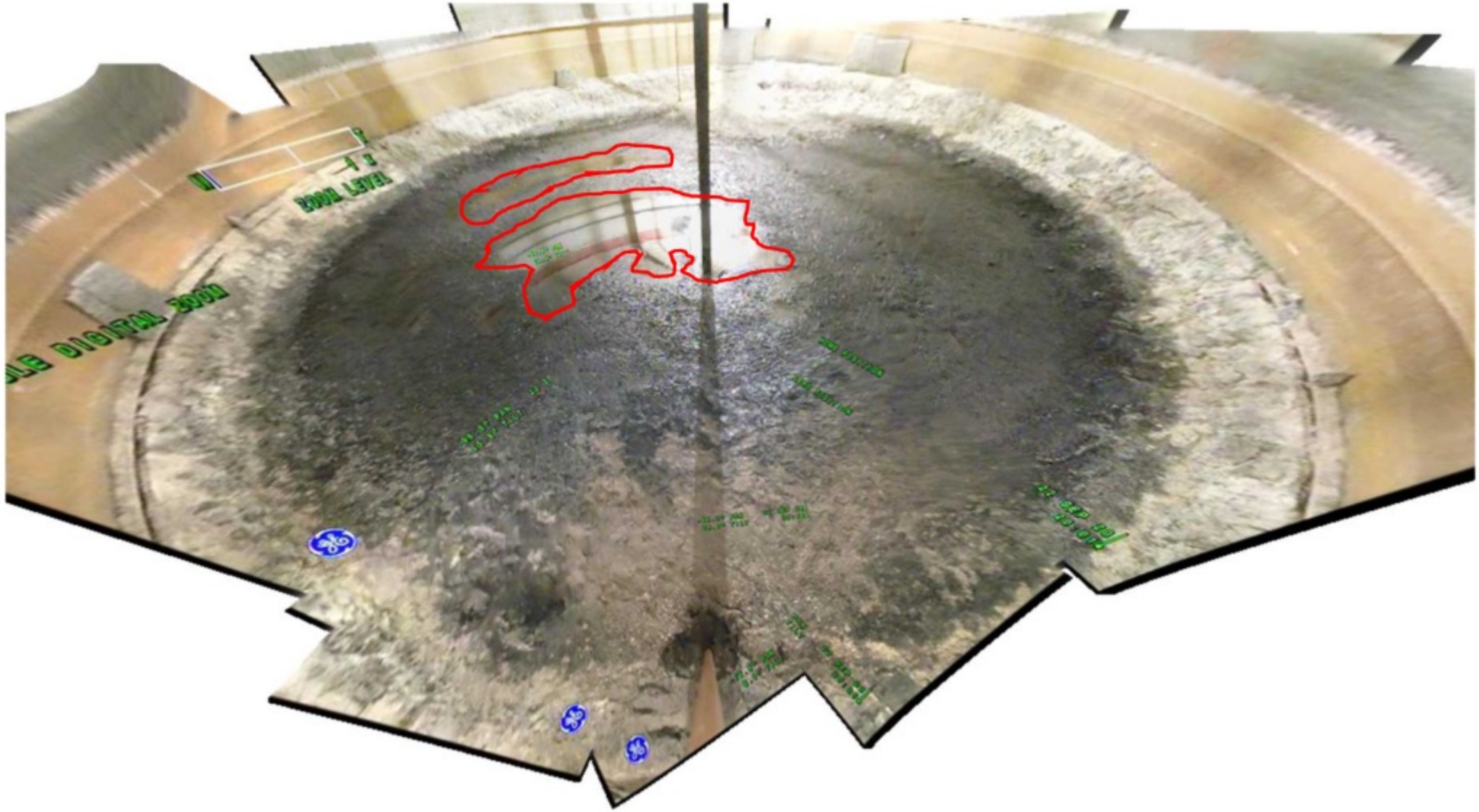


Figure 5-7. Tank B-109 September 22, 2020 Waste Surface Composite View from Riser 7

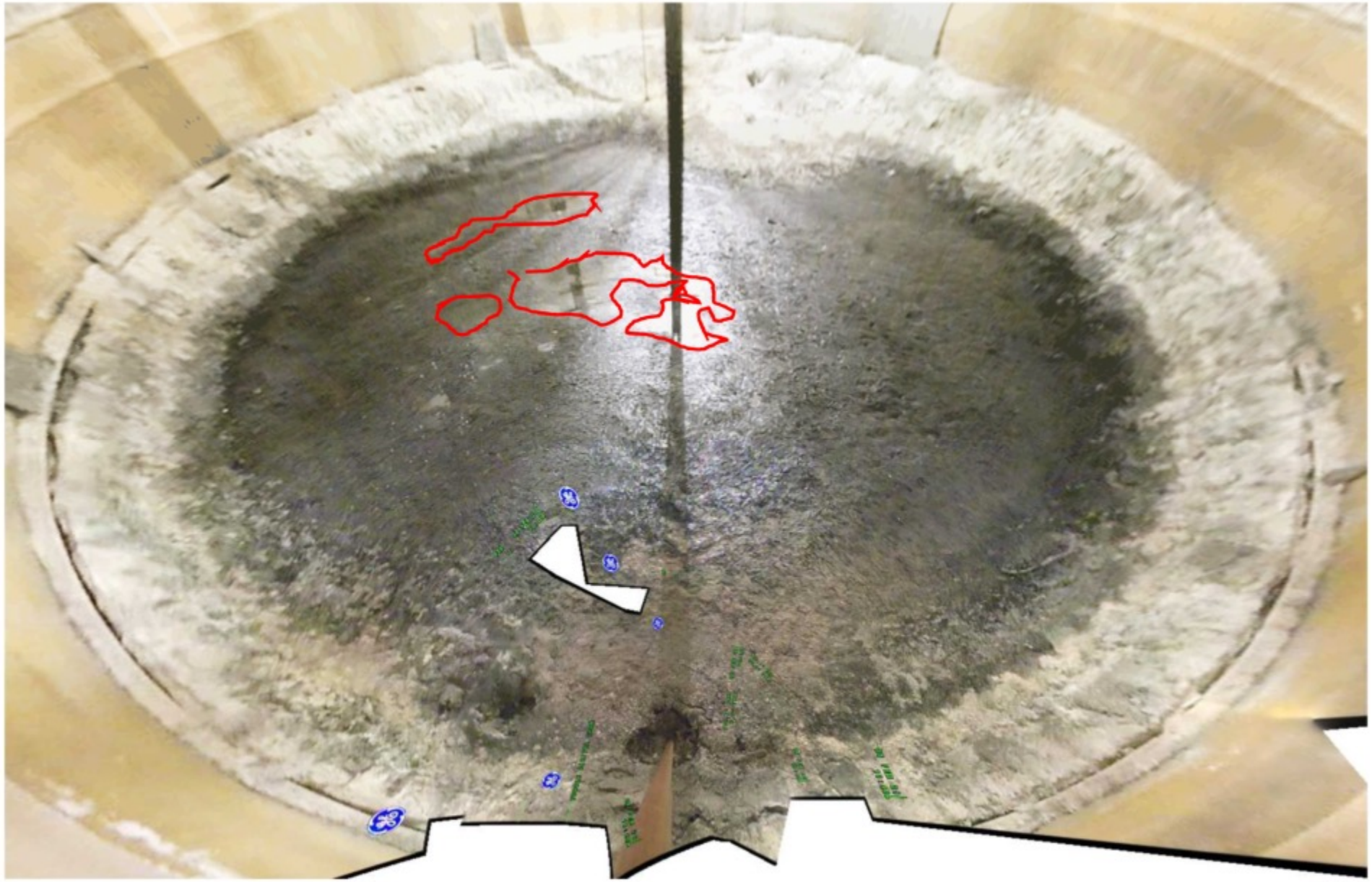


Figure 5-8. Tank B-109 February 5, 2021 Waste Surface Composite View from Riser 7

Figure 5-6. Baseline Case – Single-Shell Tank Retrieval Sequence and Timing.

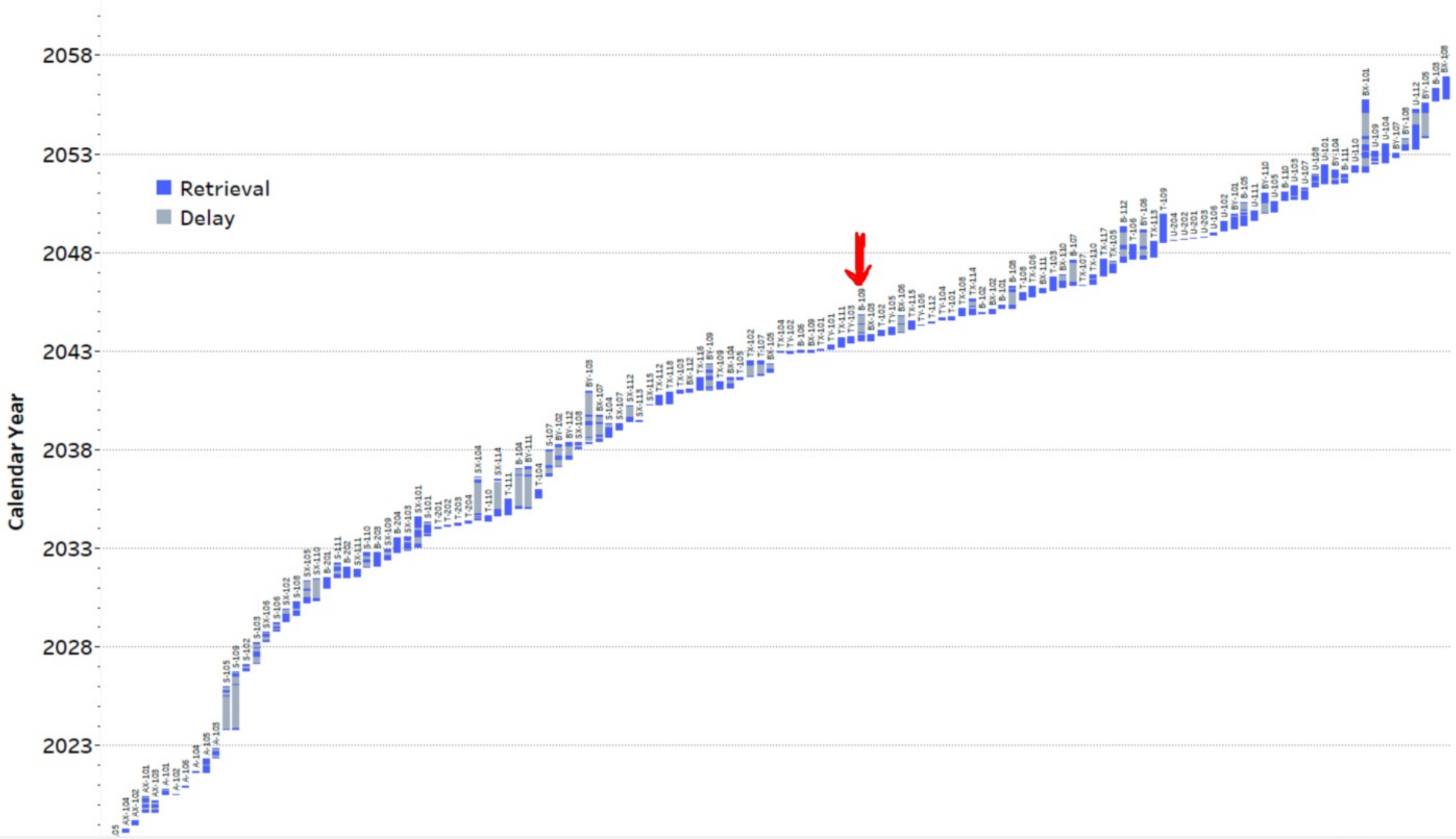
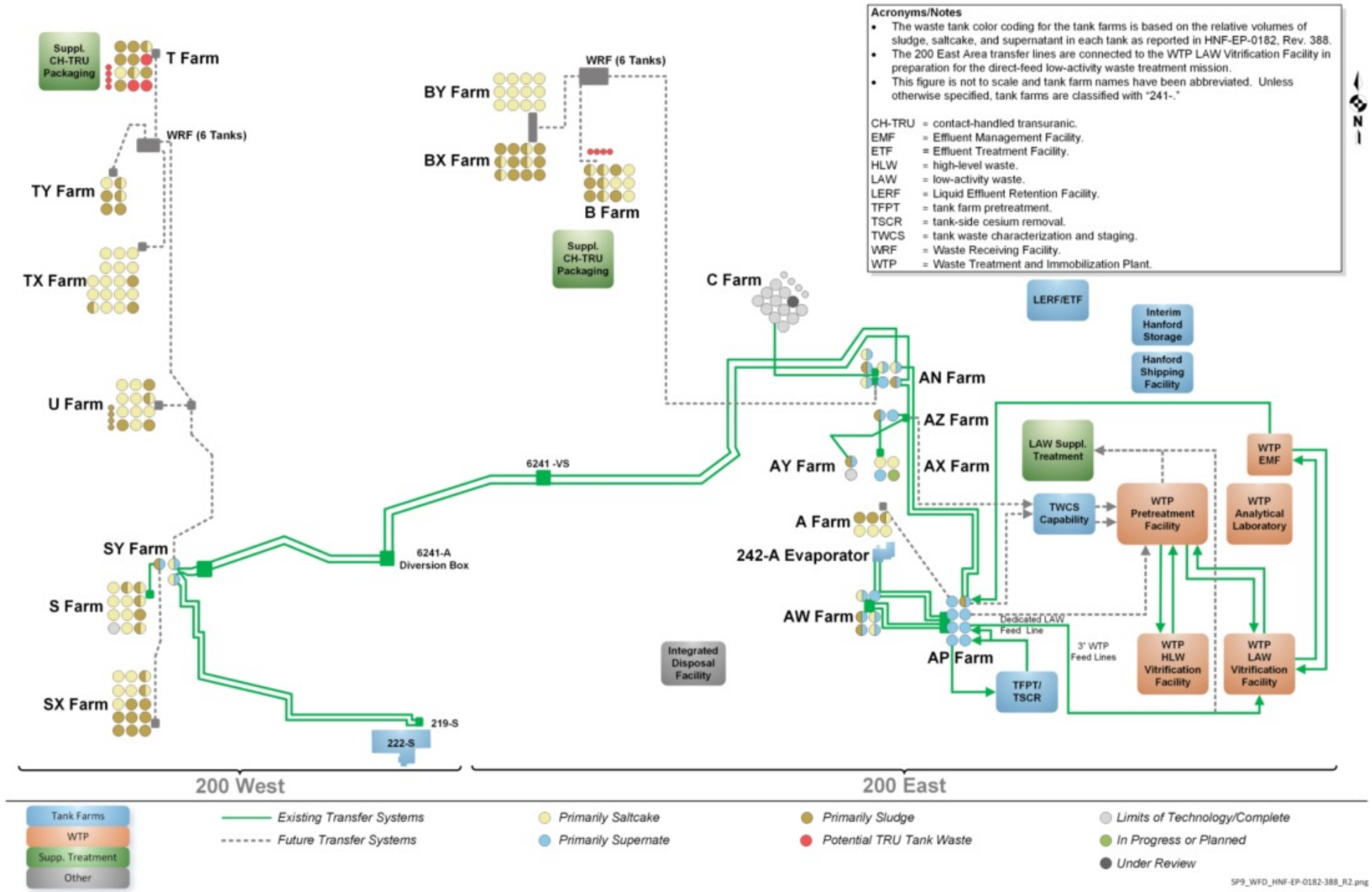
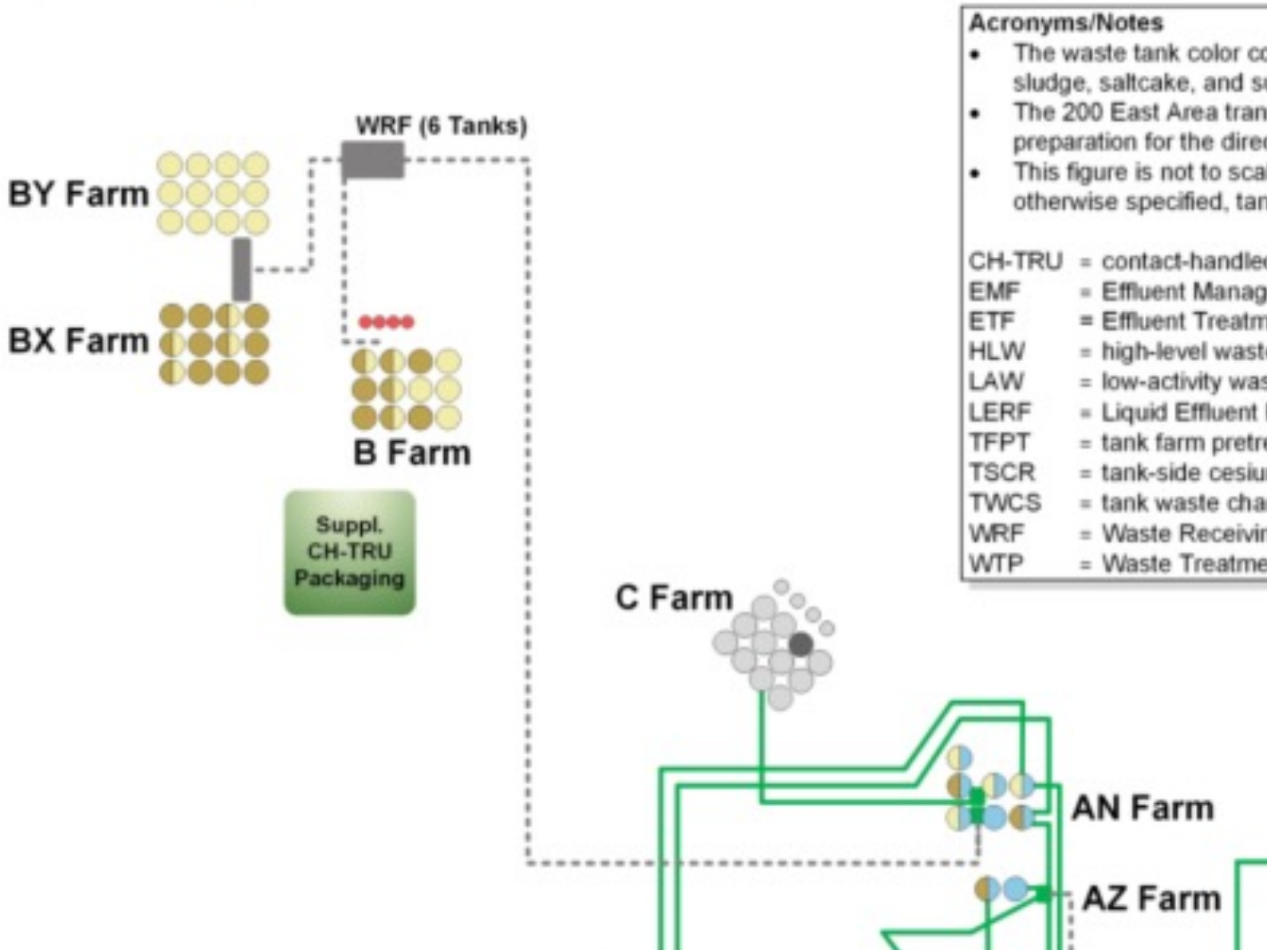


Figure 3-8. Simplified Representation of the Hanford Waste Feed Delivery System.




WRF (6 Tanks)
BY Farm
BX Farm
B Farm
Suppl. CH-TRU Packaging
C Farm
AN Farm
AZ Farm
Acronyms/Notes
• The waste tank color co
sludge, saltcake, and s
• The 200 East Area tran
preparation for the direc
• This figure is not to sca
otherwise specified, tan
CH-TRU = contact-handle
EMF = Effluent Manag
ETF = Effluent Treatm
HLW = high-level wast
LAW = low-activity was
LERF = Liquid Effluent
TFPT = tank farm pretr
TSCR = tank-side cesiu
TWCS = tank waste cha
WRF = Waste Receivi
WTP = Waste Treatme

Analyte	Phase	Waste Type	Qualifier	Inventory	Units	RSD %	Basis	Calculation (density*volume* concentration*conversion*multiplier)
137Cs	Saltcake Interstitial Liquid	B-SltCk (Liquid)		2.53E+02	Ci		Template Engineering	1.26 g/ml * 40 kL * 5.43233 uCi/g * 1 * 0.925
137Cs	Saltcake Solid	B-SltCk (Solid)		5.51E+02	Ci		Template Engineering	1.72 g/ml * 226 kL * 1.25296 uCi/g * 1 * 1.132

Cesium-137:

253 Curies in 13,000 gallons of interstitial liquid

551 Curies in 59,000 gallons of saltcake (non-liquid)

99Tc	Saltcake Interstitial Liquid	B-SltCk (Liquid)		1.21E-01	Ci		Template Engineering	1.26 g/ml * 40 kL * 0.00260305 uCi/g * 1 * 0.925
99Tc	Saltcake Solid	B-SltCk (Solid)		2.64E-01	Ci		Template Engineering	1.72 g/ml * 226 kL * 0.000600972 uCi/g * 1 * 1.132

Technetium-99:

0.12 Curies in 13,000 gallons of interstitial liquid **(3 million pCi/L!)**

0.26 Curies in 59,000 gallons of saltcake (non-liquid)

Table A6-2. Drainable Interstitial Liquid Removal Technology Analysis Results.

Technology	Raw Scores				Weighted Total
	Likelihood of Success (35%)	Design Maturity (25%)	ALARA (20%)	Reliability and Complexity (20%)	
Technology 1 – Enhanced Supernatant Pumping System	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Technology 2 – Single-Pass Ventilation System	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Technology 3 – Air Recirculation with Condensate Recovery	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Technology 4 – Permeable Media Conveyor	33	4	19	10	18.35
Technology 5 – Enhanced Saltwell Pumping	55	50	20	45	44.75
Technology 6 – Single-Use Absorption Media Cartridge	29	2	4	18	15.05
Technology 7 – In-Riser Evaporator	33	9	47	12	25.60
Technology 8 – Ventilation or Recirculation with Waste Solids Surface Disturbance	10	23	42	13	20.25
Technology 9 – Ventilation or Recirculation with Interstitial Liquid Dispersion	51	42	42	43	45.35

Figure A4-5. Technology 5 – Enhanced Saltwell Pumping.

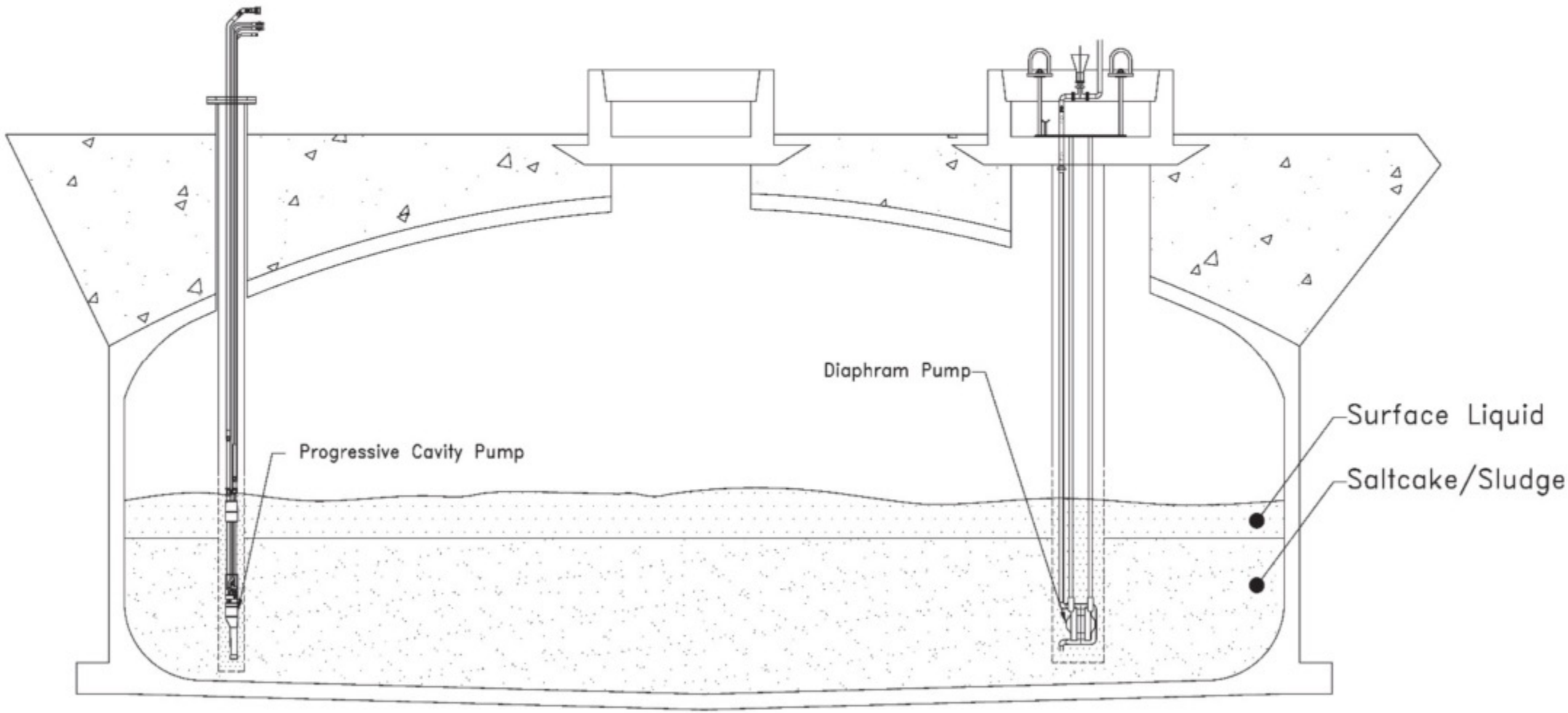
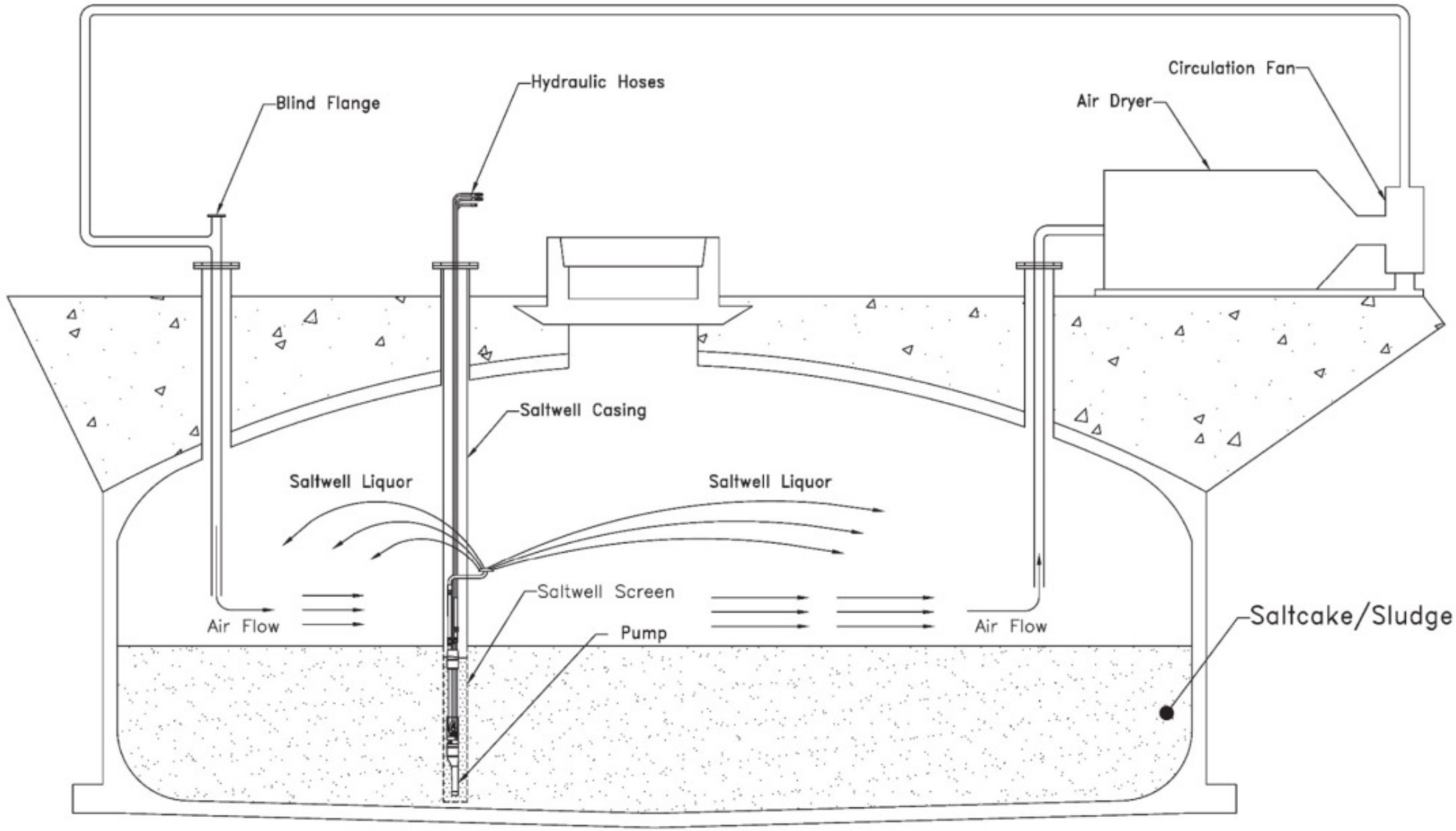


Figure A4-9. Technology 9 – Ventilation or Recirculation with Interstitial Liquid Dispersion.



Ecology also believes that the following details should be considered when establishing the list of specific tanks where USDOE can implement the preferred liquid removal technology:

- The best estimates of when each tank was to be fully retrieved under the existing framework.
- The amount of drainable liquids currently remaining in each tank.
- The composition of the drainable liquids, if available.
- The consideration of the liner integrity of each tank.

Further discussions between our agencies may identify additional or better considerations when establishing the sequence of selective retrieval tanks.

Ecology notes that RPP-RPT-62098 has identified two technologies that were rated closely in USDOE's assessment of their potential to remove drainable liquids from the SSTs, Technology #5 and Technology #9. Ecology asks USDOE to work with us to develop a work plan and schedule to conduct field testing of these two technologies. USDOE should select two SSTs for this field testing, one for Technology 9 (Ventilation or Recirculation with Interstitial Liquid Dispersion) and one for Technology 5 (Enhanced Salt-well Pumping).

Ecology has indicated that the intended purpose of Milestone M-045-93 was to investigate ways to remove more drainable liquids from the SSTs in the near term, so that the risks of longer-term storage could be reduced. It was also intended to establish a sequence and schedule for

Despite T-111's long history of suspected leaks, USDOE has never completed a formal leak assessment for this tank.

While the continued decline in liquid levels could be an indication that T-111 is currently releasing liquid waste to the soil below, Ecology recognizes there is also a possibility that the decline in liquid levels is related to other causes, such as a retained gas release cycle. Accordingly, in order to make an informed regulatory decision about the appropriate response, Ecology has determined that it is necessary for USDOE to take the following actions:

1. Install High Resolution Resistivity (HRR) monitoring equipment in T-Farm and collect additional data in order to better evaluate whether there is an ongoing release of tank waste to soil.
2. Undertake a formal leak assessment process and submit a report of the results for Ecology's review. Ecology recommends USDOE follow the leak assessment process described in TFC-ENG-CHEM-D-42.

Ecology also believes that this situation is a prime example of why USDOE needs to have a formal leak response plan in place for the SST System. Washington Administrative Code 173-303-350 requires USDOE to develop a contingency plan and emergency procedures that are designed to mitigate the potential impacts of emergency circumstances, including an "unplanned sudden or nonsudden release of dangerous waste, hazardous substance, or dangerous waste constituents to air, soil, surface water, or groundwater."

Main Points of the Proposed Advice:

1. Remove leakable liquids from leaking tanks as quickly as feasible.
2. Create a Leak Response Plan for the SSTs (with stakeholder input)
3. Feasibility Assessment for B-109 leak response. Consider all potential options and seek public input.
4. Invest in R&D to increase agility to respond to future SST leaks.
5. Check the soil around tanks sooner in leak assessment processes.
6. Include Ecology and other non-DOE/contractors in the leak assessment process.
7. Explore options to build retrieval infrastructure quicker/earlier.

STATE OF WASHINGTON
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711 for Washington Relay Service • Persons with a speech disability can call (877) 833-6341

August 26, 2021 21-NWP-141

Re: Schedule for Corrective Actions for Single Shell Tanks 241-B-109 and 241-T-111

Dear Brian A. Harkins:

The Department of Ecology (Ecology) appreciates the willingness of the United States Department of Energy (USDOE) to work collaboratively with us in developing an Agreed Order (AO). The purpose of the AO is to set out corrective actions and a schedule for responding to the leaking Single Shell Tanks (SSTs) 241-B-109 and 241-T-111.

USDOE and Ecology meet weekly, and agree to continue discussions for no more than two months, to come to an agreement on the corrective actions and schedule for the order. In these meetings we would like to come to agreement on:

- Leak response actions for both tanks.
- Dates to implement those responses.
- Dates and activities for the development of a site-wide leak response plan for all SSTs.

Any disagreements about scope or schedule will be elevated to our respective management teams for timely resolution.

We look forward to agreeing on a path forward to effectively respond to the leaking tanks.